

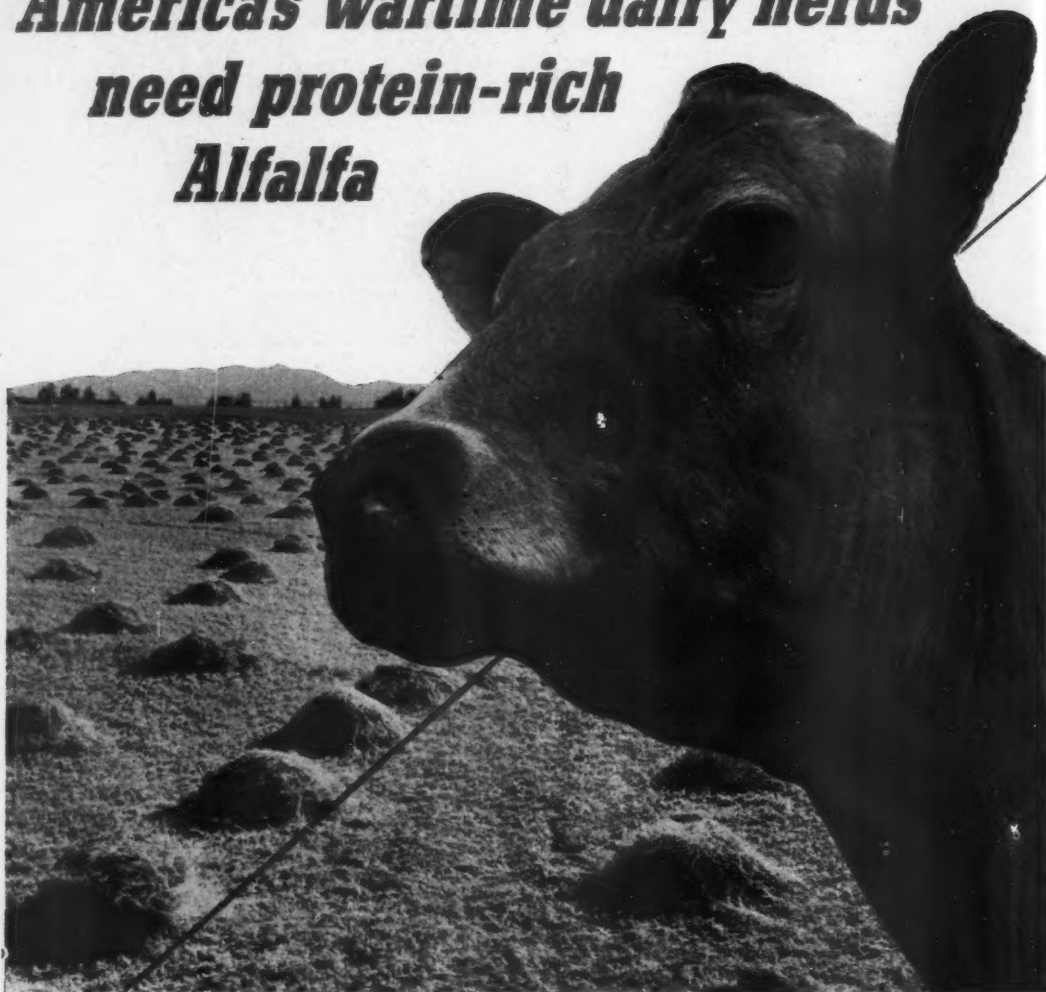
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See page 23





... THE ...

# AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 100

JUNE 3, 1944

No. 14

## Feeding Hungry Crops in War and Peace\*

By CHARLES J. BRAND

*Executive Secretary and Treasurer, The National Fertilizer Association, Washington, D. C.*

AS THE title for my talk this morning, I give you "Feeding Hungry Crops in Peace and War." That makes a more kinetic topic than the one I originally suggested, "The Place of Fertilizers in a Permanent Agriculture," for a Chemurgic Council pow-wow in the land where our American Indian thrive so recently under Nature's governance, and where he now evidences his Americanism by helpfulness in war and progress in the arts of peace.

My memory precedes the days of the "Sooners" among whom were some of my own kinspeople from Minnesota and South Dakota. When I studied elementary geography, Tahlequah was the capital of the Indian Territory, just as Bismarck was the capital, not of North Dakota, but of Dakota Territory.

Oklahoma has nearly 70,000 square miles of area, 45,000,000 acres of land, about 200,000 farms, and a population of more than 2,500,000. It is the development of only a little more than half a century and is a fine example of what can be wrought by energy, intelligence, and enterprise applied to rich natural resources under free institutions in a Christian nation.

I read in the Chicago papers yesterday some striking statements about Australia by Mr. Churchill. They reminded me of some facts that throw a highlight on what has been achieved in our western country in the last 50 years.

The modern settlement of Australia began in a small way in 1770 and was expedited by

our winning the Revolutionary War. The area of Australia is nearly 3,000,000 square miles. She has slightly more actual land area than continental United States. The best 25 per cent of her land is as good as our best 25 per cent.

Now Oklahoma has roughly 1/45th of the area of Australia and in something over a half century after settlement has a population of about 2,500,000. Australia, after more than a century and a half, has a population of only 7,000,000. Oklahoma has a population density of about 35 per square mile; Australia about 2.5.

Not long ago the President of the National Farm Chemurgic Council, my very good friend of many years, Wheeler McMillan, said in a public address: "Freedom is not a textbook abstraction nor a vague philosophical concept."

In the face of the progress we see here in the Southwest, I echo his statement. I also note that freedom of settlement is one of the freedoms about which we hear woefully little in these times.

From looking over various past programs of Chemurgic Council meetings, both national and regional, it seems that chemurgy has been interpreted almost wholly in terms of the products derived from the soil. The word "chemurgy" has been so newly coined that it is not yet defined even in our unabridged dictionaries. It would seem from its derivation that it means all of the chemical life processes of living things; the sources from which the products of the soil receive their sustenance as well as the ultimate utilization of the end products and all phases in between.

\*An address before the First Southwest Regional Chemurgic Clinic, Oklahoma City, Okla., May 20, 1944.

If a soil be rich enough in all the necessary plant nutrients, in organic matter, and in biological population and if sufficient sun, rain, and air be present throughout the growing season, concern over the chemurgy of the particular crop there grown might very well resolve itself into only the consideration of the best economic utilization of the harvested crop. But where these conditions do not prevail, the problem is a much broader one.

#### Soil Not Inexhaustible

Any bank account, no matter how large, will eventually become overdrawn if checks are issued continually and no deposits made. So it is with the soil. Every harvested crop, be it cotton or corn, milk, beef, or eggs, takes its toll of plant food from the acres on which it was produced. In the case of milk, beef, and eggs, of course, this means the acres on which was grown the feed for the animals involved. Unless the 14 or more chemical elements now accepted as necessary for optimum plant growth are in one way or another returned to the soil in amounts as great as those removed by the crops harvested, any soil will in time become impoverished. No matter how rich the virgin soil may have been in plant food and organic matter, continuous removal of crops without return of these assets will in time result in an overdraft on the bank—the soil.

A cotton crop yielding 500 pounds of lint and 1,000 pounds of seed to the acre removes from the soil of that acre 38 pounds of nitrogen, 18 pounds of phosphoric acid, and 14 pounds of potash—a total of 70 pounds of plant food.

A 60-bushel crop of corn removes in the grain 57 pounds of nitrogen, 23 pounds of phosphoric acid, and 15 pounds of potash; and if the stover is removed, the two tons of that would remove 38 pounds of nitrogen, 12 pounds of phosphoric acid, and 55 pounds of potash in addition. For the entire crop this would be 95 pounds of nitrogen, 35 pounds of phosphoric acid, and 70 pounds of potash—200 pounds, in all, of plant food.

All other crops harvested, whether they leave the farm in the form of vegetable or of animal matter, take their toll from the soil.

We cannot rest our agriculture, however, solely on the plant food content of the soil or maintain a soil's productivity merely by restoring the chemical elements removed by crops. The soil must be a comfortable and healthy place for plants to live. There must be proper drainage to permit aeration of the soil. Suitable cultivation methods must be

employed to insure that the physical condition of the soil is satisfactory for the growth of plants. If necessary the chemical reaction of the soil must be corrected so that there may be the optimum degree of acidity for the crop to be grown. This often means the addition of large amounts of dolomite or limestone to decrease the acidity which gradually increases over the years in most cultivated soils. In some cases, particularly out here in the great West, a soil may be alkaline in reaction, and so may require the opposite type of correction to turn it in the direction of being acid.

#### Need for Organic Matter

Another most important requirement for the successful maintenance of production is the presence of sufficient organic matter in the soil. A healthy, vigorous, and abundant bacterial population of the soil is necessary for the best results in crop production and can exist only if the soil is well supplied with organic matter, which is necessary to the well-being of the bacterial population. For many years The National Fertilizer Association has advocated the continual return of organic matter to the soil as an indispensable factor of good agricultural practice.

In addition to many articles in current publications and many addresses by members of our staff before agricultural gatherings, we have published several pamphlets on the subject of organic matter which have been distributed by the hundreds of thousands to farmers and agricultural workers. We have also produced a motion picture in color and sound, called "The Life of the Soil," which has now been shown in 43 States to over 1,750 agricultural audiences of a total of more than 105,000 persons. With this film goes a bulletin entitled "Organic Matter—The Life of the Soil."

Organic matter is essential to good agriculture but, despite the fervor of the enthusiasts, used alone it will neither maintain nor restore fertility in a soil as has been claimed frequently in recent months on forums such as we are taking part in today. In the same breath it has been stated that fertilizers have destroyed as many acres as has soil erosion. Such a statement is, of course, utterly unfounded and ridiculous. Erosion has completely destroyed the usefulness of some 100,000,000 acres of our best soils and has damaged millions of additional acres, while there is no record in the literature of commercial fertilizers ever having damaged the land. It is true that the use of fertilizers alone will not insure continued maximum crops year

after year. If any of the other necessary good agricultural practices that I have mentioned are neglected or ignored, in time failure will be the result. Just as surely in time failure will result if we continue to remove harvested crops from a soil and never make any return of plant food. All good agricultural practices must be included in our procedures—not one nor a few.

#### To Plow or Not to Plow

I emphasize the sound attitude on organic matter that competent agronomists have held so long partly because there has been published only recently by the University of Oklahoma Press at Norman a small volume entitled *Plowman's Folly*, by E. H. Faulkner, a native of Kentucky moved to Ohio. Faulkner is by no means an untrained agriculturist. He was born and brought up on a farm, was educated at the College of Agriculture of the University of Kentucky, and served for a period of years as a county agricultural agent.

Faulkner takes the position strongly that our common moldboard plow that has been used in one form or another for centuries is the criminal that has caused the erosion that has destroyed hundreds of millions of acres of good soils, injured additional millions, and despoiled most of the arable lands where that plow is used of billions of tons of natural mineral plant foods elaborated by nature through the ages.

If a man holding such views is sincere, and I believe Faulkner is, he should at least be given a respectful hearing. It seems to me that there is much in his theory but like so many enthusiasts he is an extremist.

There is real merit in his ideas for ending runoff and erosion by conservation of crop residues, leaves, and every available bit of plant tissue. These ideas are not wholly new. But when all this has been done, the world will go hungry if chemical and mineral plant foods are not added wherever heavy cropping is practiced. What would become of Belgium and England, for instance, if they did not aid nature or import foods and feeds from other parts of the world? And how could such foods and feeds be produced without supplementing the plant foods in the soils?

Faulkner, in his overstatements, reminds me of one of his friends who is also at times a critic, Louis Bromfield. Recently at a large meeting in Atlanta, at which I followed him as a luncheon speaker, Bromfield said that Georgia should have 100 times as many head of cattle as she now has. He did not realize

the utter impossibility of his prescription. If Georgia had such large herds she would have more livestock than the whole United States plus all the rest of North America. Incidentally, they would starve to death. Nevertheless, Georgia should have more livestock than she now has.

One might think from reading *Plowman's Folly* that chemical plant foods are on their last legs, whereas I believe the greatest part of their future lies before us.

#### Commercial Fertilizer a Relative Recent Development

Up until about 100 years ago, the farmers of the world produced food for an ever-increasing population without the aid of commercial plant food. The value of animal manure, of growing clover and other legumes, and of liming, and the fertilizing value of bone have been known for centuries; but the commercial production of superphosphate was begun in England in 1842; the first nitrate of soda was imported into this country in 1830; the first Peruvian guano, in 1832; and the value of potash as a fertilizer was first demonstrated by von Liebig in Germany in 1845.

The first mixed fertilizers were produced in Baltimore about 1850. But as late as 1880, our total consumption of fertilizer was only 1,150,000 tons; last year it was 11,500,000 tons. The plant-food content of the fertilizer sold in 1880 was 13.5 per cent; in 1942 and 1943 it was 20.2 per cent.

As late as 1920, we consumed only 228,000 tons of actual nitrogen as fertilizer, last year we used 460,000 tons, and this year it is estimated that we shall use about 625,000 tons.

For 75 years we have led the world in the production of superphosphate, but in 1880 we produced only 205,000 tons; and in 1943, 7,072,000 tons, basis 18 per cent  $P_2O_5$ . The latter figure includes both normal and concentrated superphosphate.

Potash consumption in this country began about 1870, and in 1880 we imported 20,000 tons of actual potash ( $K_2O$ ) from Germany. As late as 1938, we were still importing nearly half of the total potash used in our agriculture, amounting that year to 385,000 tons of  $K_2O$ . In 1943, we used 600,000 tons of  $K_2O$  as fertilizer, and all except 10,000 tons was produced by our domestic plants.

We estimate, and agricultural authorities accept our figures as conservative, that, although only about 70,000,000 out of a total of more than 370,000,000 acres of cropland are being fertilized at the present time, fully

(Continued on page 22)



### April Sulphate of Ammonia

Production of by-product sulphate of ammonia during April continued at the high daily level set during March, according to the U. S. Bureau of Mines. Total production declined about 3 per cent, which is accounted for by the slightly shorter month. Sales declined from 72,855 tons during March to 64,796 tons during April, a drop of about 11 per cent. As a result, stocks on hand, April 30th, increased to 26,750 tons, a rise of 20 per cent. Ammonia liquor production showed little change, with production continuing at a daily level of about 90 tons  $\text{NH}_3$ .

	Sulphate of Ammonia Tons	Ammonia Liquor Tons $\text{NH}_3$
Production		
April, 1944.....	67,671	2,680
March, 1944.....	69,712	2,771
April, 1943.....	63,840	2,872
January-April, 1944.....	269,815	10,793
January-April, 1943.....	252,881	11,233
Sales		
April, 1944.....	64,796	2,618
March, 1944.....	72,855	2,705
April, 1943.....	63,351	3,066
Stocks on Hand		
April 30, 1944.....	26,750	662
March 31, 1944.....	22,251	750
April 30, 1943.....	23,585	728
March 31, 1943.....	23,325	801

### Lower Prices on Ammonium Nitrate

Prices of Ordnance plant ammonium nitrate being distributed by Associated Cooperatives, Inc., as agent for the Commodity Credit Corporation, have been ordered reduced for the third quarter of this year in a move to expedite the shipment of the material to fertilizer manufacturers.

During June and July the new price fixed for the material will be \$46 a ton, f. o. b. the nearest producing plant; for August, the price will be \$47; and for September, it will be \$48. This compares with a price of \$50 a ton which has prevailed since February when CCC first took over handling of the distribution program.

The new pricing schedule also provides an alternative discount plan to encourage early shipments, under which buyers who place their orders before July 1st for equal monthly shipments during July, August and September, will be allowed a 5 per cent discount at the time of the invoice and an additional discount of  $1\frac{1}{2}$  per cent when the order is completed.

The new prices for ammonium nitrate will tend to narrow considerably the spread between the price that has prevailed for the United States Ordnance material and that which is paid in areas of the country served by Canadian producers. The fact that farmers in the Northern section of the country have been able to acquire Canadian ammonium nitrate at prices far less than that prevailing for the domestic has led to bitter criticism in Congress, directed at TVA, and at David Lilienthal, chairman of the board of TVA, in particular.

Canadian ammonium nitrate is quoted to consumers in the United States at \$47.50 per ton at the producing point for the grade containing 32.5 per cent nitrogen. The officially fixed price to Canadian consumers is \$60.60 per ton for the 34 per cent grade, f. o. b. Ontario manufacturing points.

### Chicago Drainage District to Build Fertilizer Recovery Plant

The War Production Board has announced that it has approved and forwarded to the Chicago Sanitary District priority assistance for the first of two projects designed to provide 73,750 tons of organic fertilizer a year for agricultural uses by removing 500 tons of solids a day from the Des Plaines river, the Calumet-Sag channel and the Illinois river. These streams drain the Chicago Sanitary District. Officials said the District was regarded as the greatest potential source of organic fertilizer in the United States.

The priorities approved for the initial project cover \$289,432 of equipment for the extension of fertilizer production facilities at the southwest side sewage treatment plant and will permit production of 19,000 tons of organic fertilizer annually. At the rate of \$17.50 a ton, this will have an annual value of \$332,500, officials said.

The product is used in the culture of citrus trees and releases an equivalent quantity of other fertilizers for use in the culture of growing crops.

W. H. Trinkhaus, chief engineer and general manager of the Chicago Sanitary District, has now applied for priority assistance for a second and larger project of similar nature calling for the expenditure of \$5,526,000. This project would increase the organic fertilizer production at the plant by 54,750 tons, having an annual value of \$2,171,000. This application is now pending.



## Phosphate Rock Industry of the United States in 1943

A NEW record for the marketed production of domestic phosphate rock was made in 1943, according to reports by the producers to the Bureau of Mines, United States Department of the Interior, the quantity sold or used by producers reaching 5,126,232 long tons, nearly half a million tons greater than the previous record of 1941. Florida was the only state showing an increase in sales. The value, nearly 2½ million dollars more than that of 1942, was less than that of 1920. Mined production reached a new high point in 1943—5,369,967 long tons. Stocks in producers' hands at the end of the year were less than on December 31, 1942. Domestic consumption reached new heights. In 1943, for the first time, figures for the  $P_2O_5$  content of the domestic production and sales of phosphate rock have been collected by the Bureau of Mines from the producers, and are given in the accompanying salient statistics table.

The  $P_2O_5$  content of domestic phosphate rock sold or used in 1943 was 1,654,493 long tons.

### Production

A new high record for phosphate rock mined in the United States was made in 1943, exceeding the previous high made in 1941 by 447,784 tons. Phosphate rock was mined in 1943 in Florida, Tennessee, Montana, and Idaho, and apatite in Virginia. (See table II).

### Sales

The quantity of domestic phosphate rock sold or used by producers made a new high record in 1943, exceeding the previous maximum of 1941 by nearly half a million tons. The total value was nearly 2½ million dollars more than that of 1942 but was still about 6 million dollars below the record value of the

TABLE I  
SALIENT STATISTICS OF THE PHOSPHATE-ROCK INDUSTRY IN THE UNITED STATES, 1942-43

	1942			1943			
	Long tons	Value at mines		Long tons		Value at mines	
		Total (1)	Average (1)	Rock	$P_2O_5$ content	Total (1)	Average (1)
Production (mined).....	4,818,938			5,369,967	1,611,215		
Sold or used by producers:							
Florida:							
Land pebble.....	2,893,756	\$8,826,705	\$3.05	3,483,194	1,179,314	\$11,633,241	\$3.34
Soft rock.....	48,470	155,345	3.20	71,171	14,739	254,995	3.58
Hard rock.....	70,014	396,527	5.66	34,128	12,208	201,241	5.90
Total Florida....	3,012,240	9,378,577	3.11	3,588,493	1,206,261	12,089,477	3.37
Tennessee <sup>2/3</sup> .....	1,366,335	6,127,792	4.48	1,309,059	375,502	5,822,249	4.45
Idaho.....	114,079	511,249	4.48	108,916	34,709	561,630	5.16
Montana.....	150,402	572,464	3.81	119,764	38,021	488,665	4.08
Utah.....	1,184	7,410	6.26				
Virginia.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total.....	4,644,240	\$16,597,492	\$3.57	5,126,232	1,654,493	\$18,962,021	\$3.70
Producers' stocks, December 31:							
Florida <sup>2</sup> .....	1,426,000	(1)	(1)	1,110,000	371,000	(1)	(1)
Tennessee <sup>2/3/4</sup> .....	437,000	(1)	(1)	640,000	136,000	(1)	(1)
Other.....	4,000	(1)	(1)	2,000	1,000	(1)	(1)
Total stocks.....	1,867,000	(1)	(1)	1,752,000	508,000	(1)	(1)

<sup>1</sup>Figures not available.

<sup>2</sup>Includes sintered matrix.

<sup>3</sup>Virginia included with Tennessee.

<sup>4</sup>In-

cludes brown-rock matrix of sinter grade, sintered brown rock, and blue rock.

boom year 1920. The average value per ton increased. (See table III).

TABLE II  
PHOSPHATE ROCK MINED IN THE UNITED STATES,  
1934-43, BY STATES, IN LONG TONS

Year	Florida	Tennessee <sup>1</sup>	Western States	United States
1934	2,464,969	394,311	38,958	2,898,238
1935	2,598,337	493,501	67,490	3,159,328
1936	2,645,819	737,866	79,152	3,462,837
1937	3,179,588	942,158	139,670	4,261,416
1938	2,722,927	999,551 <sup>2</sup>	137,998	3,860,476
1939	2,791,360	1,057,570	139,040	3,987,970
1940	2,782,956	1,120,551	164,570	4,068,077
1941	3,417,900	1,301,067	203,216	4,922,183
1942	2,984,503	1,568,162	266,273	4,818,938
1943	3,274,266	1,868,407	227,294	5,369,967

<sup>1</sup>Includes small quantity of apatite from Virginia.

<sup>2</sup>Includes also small quantity of phosphate rock from South Carolina.

TABLE III  
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS  
IN THE UNITED STATES, 1939-43

Year	Long tons	Value at mines	
		Total	Average
1939	3,757,067	\$12,294,042	\$3.27
1940	4,002,700	12,334,662	3.08
1941	4,689,652	15,596,273	3.33
1942	4,644,240	16,597,492	3.57
1943	5,126,232	18,962,021	3.70

TABLE IV  
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS  
IN THE UNITED STATES, 1942-43, BY GRADES

	1942		1943	
	Quantity	Per cent of total	Quantity	Per cent of total
Grades—B. P. L. <sup>1</sup> content (per cent):				
Below 60	477,916	10	566,704	11
60 to 66	1,412	( <sup>2</sup> )	186,726	4
68 basis, 66 minimum	373,329	8	264,043	5
70 minimum	198,820	4	490,208	9
72 minimum	1,686,312	37	1,611,500	31
75 basis, 74 minimum	736,797	16	698,476	14
75 minimum				
77 basis, 76 minimum	559,111	12	851,055	17
77 minimum				
Above 85 (apatite)	610,543	13	457,520	9
Undistributed <sup>3</sup>				
	4,644,240	100	5,126,232	100

<sup>1</sup>Bone phosphate of lime.

<sup>2</sup>0.5 per cent or less.

<sup>3</sup>Includes grades of B. P. L. content 65.9, 68.2, 68.6, 68/69, 69, 69.2-69.4, 71, 73, 73.2, 73.3, 73.6, 73/74, 77 plus, 78, and above 85 per cent; B. P. L. content not known for ground phosphate rock and dust in 1942.

### Distribution of Sales

Nearly a third of the phosphate rock sold or used by producers in the United States in 1943 was of the 72 per cent B. P. L. grade, and all grades above this equalled about another third. Phosphate rock containing less than 60 per cent B. P. L. continued to form an increasing part of the total sold or used—reaching eleven per cent of the total in 1943—or more than half a million tons.

In 1943, 78 per cent of the domestic phosphate rock sold or used by producers is reported to have gone into the manufacture of superphosphates. The quantity so used was nearly three-quarters of a million tons greater than in 1942. A sharp decline is reported in the amount sold or used for the production of various chemicals, but the quantity sold or used for direct application to the soil continued its upward trend, and that utilized for making stock and poultry feed jumped from 8,466 long tons in 1942 to 67,288 tons in 1943. (See table IV).

### Prices

The ceiling prices per long ton of various grades of Florida and Tennessee unground phosphate rock are shown in Table V. Maximum prices on Florida land pebble and Tennessee brown rock were established by the Office of Price Administration in a schedule issued October 13, 1942, effective

TABLE V  
CEILING PRICES PER LONG TON OF FLORIDA AND  
TENNESSEE UNGROUND PHOSPHATE ROCK,  
F. O. B. CARS AT MINES, IN 1943<sup>1</sup>

Florida land pebble			
Grades—		Prices	
B. P. L. <sup>2</sup> content (per cent)			
68/66		\$2.00	
70/68		2.40	
72/70		3.00	
75/74		4.00	
77/76		5.00	
Tennessee brown rock			
Grades—		Prices	
B. P. L. <sup>2</sup> content (per cent)		Jan. 1-Dec. 2	Dec. 2-31
68/66		\$4.30	\$4.50
70/68		4.80	5.00
72/70		5.30	5.50

<sup>1</sup>Office of Price Administration, MPR 240, Oct. 13, 1942; MPR 240, Amendment 3, Nov. 27, 1943.

<sup>2</sup>Bone phosphate of lime.

October 19, 1942 (Maximum Price Regulation 240). An amendment to this regulation (MPR 240, amendment 3) issued November 27, 1943, effective December 3, 1943, increased Tennessee producers' prices 20 cents

a ton to compensate mine operators for wage increases granted to their employees.

#### Review by States

**Florida.**—New records were set in 1943 in the quantities of land pebble, soft rock, and total Florida phosphate rock sold or used, whereas the quantity of hard rock marketed was less than half that of 1942. The total quantity of phosphate rock sold or used by producers in Florida was 219,109 tons more than the previous record of 1920. The total value of the rock sold or used in 1943, was, however, over seven million dollars less than that of 1920. Soft rock sales were much above the previous record high of 1937. The average values per ton for all types were higher in 1943 than in 1942.

In the hard-rock phosphate field, mining was carried on in 1943 only at the joint operations of C. & J. Camp, Inc., and J. Buttgenbach & Co. in sec. 22, Citrus County, about 3 miles from Hernando. The only other hard-rock-phosphate mining company—the Dunnellon Phosphate Mining Co., of Savannah, Ga.—did no mining in 1943 but shipped from stocks. Virtually all of the shipments of hard rock during the year were for export.

The mine and washer of the Pembroke Chemical Corporation, Pembroke, Fla., in the land pebble field were shut down during the year, but the drying plant operated, and shipments of dried rock were made. The other seven companies usually operating in the land pebble field—American Cyanamid

Co., Brewster, Fla.; American Agricultural Chemical Co., Pierce, Fla.; Coronet Phosphate Co., Plant City, Fla.; International Minerals & Chemical Corporation, Mulberry, Fla.; Phosphate Mining Co., Nichols, Fla.; Southern Phosphate Corporation, Ridgewood, Fla.; and the Swift & Co. Fertilizer Works, Agricola, Fla.—continued to mine and ship land pebble.

Stocks of Florida phosphate rock on December 31, 1943, as reported by producers, were down sharply from the previous year to 1,110,000 long tons, 316,000 tons less than on December 31, 1942.

The Dixie Phosphate Co., one of the several companies producing "colloidal" phosphate, leased its plant at Dunnellon, Fla., on October 22, 1943, to the Sea Board Phosphate Co., S. W. Corner Meadow and McKean Sts., Philadelphia 48, Pa., which operated it during the balance of the year.

**Tennessee.**—According to reports from the producing companies, the tonnage of phosphate rock sold or used by Tennessee producers in 1943 (plus a small quantity of apatite from Virginia) declined for the first time in many years. The phosphate rock sold or used—all brown rock, except for a little blue rock used by the Tennessee Valley Authority, withdrawn from its stocks, and the Virginia apatite—totaled 1,309,059 long tons, nearly 60,000 tons less than in 1942. The total value was also less than in 1942 but still greater than in immediately preceding

(Continued on page 24)

TABLE VI  
FLORIDA PHOSPHATE ROCK SOLD OR USED BY PRODUCERS, 1939-43, BY KINDS

Year	Hard rock			Soft rock <sup>1</sup>		
	Long tons	Value at mines		Long tons	Value at mines	
		Total	Average		Total	Average
1939	89,096	\$411,455	\$4.62	41,906	\$128,435	\$3.06
1940	22,367	100,353	4.49	41,845	102,508	2.45
1941	38,116	211,049	5.54	47,750	132,472	2.77
1942	70,014	396,527	5.66	48,470	155,345	3.20
1943	34,128	201,241	5.90	71,171	254,995	3.58
Year	Land pebble			Total		
	Long tons	Value at mines		Long tons	Value at mines	
		Total	Average		Total	Average
1939	2,547,782 <sup>2</sup>	\$7,353,567 <sup>2</sup>	\$2.89	2,678,784 <sup>2</sup>	\$7,893,457 <sup>2</sup>	\$2.95
1940	2,780,800 <sup>2</sup>	7,538,316 <sup>2</sup>	2.71	2,845,012 <sup>2</sup>	7,741,177 <sup>2</sup>	2.72
1941	3,279,706	9,890,510	3.02	3,365,572	10,234,031	3.04
1942	2,893,756	8,826,705	3.05	3,012,240	9,378,577	3.11
1943	3,483,194	11,633,241	3.34	3,588,493	12,089,477	3.37

<sup>1</sup>Includes material from waste-pond operations.

<sup>2</sup>Includes sintered matrix.

### **Burlap Bags for Fertilizer Permitted**

Quota restrictions on acceptance of new burlap bags have been eliminated, the War Production Board announced on May 29th. However, inventory restrictions remain unchanged.

In view of the somewhat improved burlap supply from India, and the tight supply of cotton shipping sacks, Textile Bag Order M-221 is amended to permit an increased use of burlap. The list of commodities which may be shipped in new burlap sacks has been extended to include fertilizer, refined sugar, and meat tankage.

General regulations on bags for the shipment of wool remain, but the increased availability of burlap has made it possible to eliminate the more detailed restrictions, WPB officials said.

To assure maximum packing utility for every textile bag, false seams are prohibited. The maker or user may not stitch in an additional seam which permits the bag to be packed at less than full capacity, the WPB said. Permitted bag sizes for certain commodities are specified in M-221.

Users not permitted to use new textile bags under Order M-221 are urged to investigate the possibility of supplying their needs with second-hand bags which, it is reported, are available in adequate quantity.

Since all burlap is imported from India, the future supply depends entirely on conditions there, which cannot be foreseen at this time, the WPB said.

### **Increase in Illinois Fertilizer Consumption**

A grade survey for calendar year 1943 has just been completed by Dr. E. E. DeTurk, of the Department of Agronomy, University of Illinois. The total tonnage sold during the year was 103,189 tons, of which 89,079 tons consisted of mixed fertilizer, 14,110 tons of materials. The spring tonnage was 77 per cent of the total; the fall tonnage, 23 per cent. In addition, 10,990 tons of superphosphate were distributed by AAA.

Fertilizer consumption in Illinois has almost trebled in five years, for in 1939 only 40,673 tons were sold. The ten leading grades included 97 per cent of the total tonnage in 1943, and 99 per cent of the mixed fertilizer contained 20 per cent or more of total plant food. The total tonnage of phos-

phate rock used by Illinois farmers in 1943 was 175,581 tons, of which 57,846 tons were distributed by AAA.

### **Increased Superphosphate Supply for Western States**

Maximum prices for ordinary and triple superphosphate produced in the East for sale to farmers in the West were announced on May 29th by the OPA.

This action, effective June 1, 1944, establishes a practical basis for the movement of these fertilizers into areas of temporary shortage from points where production exceeds current requirements, the OPA said.

The measure will permit western farmers to pay a higher price for the eastern superphosphate than they may pay for superphosphate produced in the West. The difference, for deliveries into the vegetable producing areas of the Imperial Valley, where shortages are most acute, amounts to about \$7.60 per ton for 20 per cent superphosphate and about \$3.00 per ton for 47 per cent superphosphate, over going western prices for these products.

The actual difference in freight from eastern points as compared with freight from western points to the consuming areas in the West, is much greater than the difference in price, according to OPA.

However, in order to keep the price of eastern superphosphate as nearly comparable as possible to the price for the locally produced material, western fertilizer distributors have expressed a willingness to handle these emergency movements on very narrow margins as an accommodation to their farmer-consumers who are unable to obtain their full superphosphate requirements from western producers.

The western States in which the new ceiling prices for eastern superphosphate will be effective are Washington, Oregon, California, Arizona, Nevada, Colorado, Utah, Idaho, Wyoming and Montana.

This action does not change the price for superphosphate produced and sold in the above States. Locally produced material will continue to represent the bulk of consumption.

The completion in the near future of additional superphosphate producing facilities in the West will make it possible to discontinue the uneconomic movement of this product permitted by this action, the price agency added.



# IT MAY BE

By SAMUEL L. VEITCH

## Agriculture

Some of the questionnaires coming out of Washington are sometimes exasperating and then again some are amusing. But here's one that takes the prize in any man's department. On pages 3824 and 3825 of the April 27, 1944, issue of the *Congressional Record*, is a reproduction of a form to be used by the U. S. Department of Agriculture, Bureau of Agricultural Economics, on "Community Organization." The farmer will just love to fill out this one. Of course, the Government is going to help him out by furnishing an interviewer (NOTE: Interviewer's salary \$212 per month, plus \$5.60 per day expenses). Here are some of the questions the farmer will be asked: Where were he and his wife born, age and amount of schooling of each member of the household including Ma and Pa, Grandma and Grandpa. These are then followed by a series of questions having to do with more intimate phases of the private life of each individual head of the household. Then they want to know something about the ethnic group to which the father belongs. If this question floors Papa Farmer, the interviewer can do his stuff by giving a lecture on ethnology. After this subject has been given full treatment, the interviewer would then like to know how many school functions the parents attended, how many card parties they attended, how many prizes were won and what they were. How many picnics they attended during the year, how many dances, how many movies. (There ought to be a large group of comedy script-writers available after the war.)

## Veterans

"The Omnibus Veterans Bill" or as it is more commonly known "G. I. Bill of Rights" has provisions that are many and varied. The term "Omnibus" beautifully describes this bill as it includes conditions for loans, unemployment benefits, hospitalization, education and other sorted related matters. The "Bill" was written to help veterans in processing their claims for disabilities, pensions, etc.

For example: at the end of World War I a soldier generally was not too careful about notations on his discharge. In his desire to

get home he would sign most anything to catch the next train out. Later, when disabilities developed, he found it difficult to establish a claim. The American Legion and the Veterans of Foreign Wars and other like organization, have played a big part in having this changed. A veteran of World War II will not be faced with these hardships.

## Invasion

It may be, invasion will come in three directions—East, West and South Europe. No doubt the Allied Air Forces have done a devastating job in destroying German communication lines and supply depots. The German manpower looks good on paper, but bombings have greatly impaired their supply system, thereby reducing the efficiency of their army divisions—all quarters in Washington are confident of victory, the only uncertainty is how long it will take to wind it up.

## War Orders

The war spending is levelled off temporarily at about \$300,000,000 a day. It may be, that some time during late summer even with both wars continuing, there will be a downward trend on spending. In the event of the German War ending, the curtailment will be drastic, and this still seems to have possibilities for developing late in 1944.

## GOVERNMENT

Here are some figures that surprised me, and they may surprise you. There are only 3,200 employers in the United States with over 1,000 workers. There are approximately 35,000 with 100 to 1,000 workers. There are 2,000,000 employers who hire less than 100 workers. Before the war, there were 46,000,000 people in this country gainfully employed. It is estimated we will have to employ from between 53 to 56 million after the war, if we are to maintain our present economy based on free enterprise. Looks like private industry is going to have to create jobs for between 7 and 10 million people. From these figures, it seems small business is going to play an important part in our national life, and postwar employment.

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## More Nitrogen Fertilizer Will Increase Feed Yields

Farmers throughout the country are urged by the War Food Administration to use more nitrogen fertilizer on corn and forage crops in order to increase yields of feed for livestock.

The extra feeds that could be produced in this way are badly needed. Farmers have increased the numbers of livestock in their herds to record levels. Reserve stocks of feed on the other hand, that were so abundant at the beginning of the war, have now largely disappeared.

WFA officials point out that hereafter farmers will be more dependent on the feeds they produce on their own farms. Feed crop yields must therefore be boosted in proportion to present livestock numbers if the animals are to be maintained at high productive levels.

WFA officials say it is possible to greatly increase yields of corn and forage crops by the use of nitrogen fertilizer. One such fertilizer now available is in the form of ammonium nitrate, a product of plants built to make munitions. It is now fairly abundant and should continue so for the next three months. This is in contrast with the situation that existed during most of the spring fertilizer season. Fortunately, this is the period of the year when ammonium nitrate can best be applied as a side dressing to row crops, and in many areas it is not too late to benefit hay lands and pastures. These applications should, of course, be made in accordance with local recommendations.

Because of the lateness of the planting season over much of the country, farmers have not currently been ordering the ammonium nitrate nor have dealers been stocking it in sufficient amounts to keep plants operating at capacity. Storage space at the plants is limited so that if farmers are to take full advantage of the opportunity to increase yields through use of the fertilizer, it must be kept moving toward their farms. Thus, farmers should consider their needs and promptly contact their fertilizer dealer, county agent, or local AAA committeeman about ordering needed supplies.

Over the country as a whole the average application of nitrogen fertilizer by farmers on corn and forage crops is low—much less than 10 pounds of nitrogen per acre. Results from many experiment stations have shown, however, that the application for these crops in many areas could be as much as 32 pounds of nitrogen per acre.

As for the results that can be expected from use of additional nitrogen, the War Food Administration specialists point to results of practical and scientific tests. These show that in general under good conditions two pounds of nitrogen will produce a bushel of corn. That is the equivalent of 325 bushels of corn per ton of ammonium nitrate, as the fertilizer contains 32.5 per cent nitrogen.

On forage crops the tests show that a pound of nitrogen can be expected to produce 30 additional pounds of high-quality hay or pasture. On that basis a ton of ammonium nitrate would produce more than nine additional tons of forage.

In addition to the greater yields from the same land, the crops produced with the additional nitrogen also should be of better quality. This is true regardless of whether the nitrogen is applied as ammonium nitrate or in some other form. Altogether, the results from using nitrogen fertilizer on feed crops should be worth several times the cost and effort in applying it.

### Federal Fertilizer Law Proposed

A bill (H. R. 4806) proposing a Federal fertilizer control law has been introduced into the House by Representative William Lemke of North Dakota and referred to the Committee on Agriculture. The bill proposes that all manufacturers, importers, and shippers of fertilizers and fertilizer materials in interstate commerce shall be licensed annually by the Secretary of Agriculture and would require that each grade of fertilizer and fertilizer material sold in interstate commerce be registered with the Secretary of Agriculture.

The following items must be guaranteed and branded on the bags: available nitrogen, maximum water-soluble nitrogen, minimum organic nitrogen, available phosphoric acid as determined by the Wagner citric acid method, potash, and the total pounds of plant food. The number of pounds and source of filler with the added notation "worthless as a fertilizer" must be added. No artificial color or odor is permitted. No pyrites cinder, coal cinders, or any injurious or deleterious filler may be used. Leather, hair, hoofs, horns, or wool waste treated or untreated, if used, must be clearly declared on the bag. Tobacco fertilizers must not contain any ammonium sulphocyanide or more than 0.5 per cent of anhydrous borax. The amount

and analysis of each material or source of plant food used, in pounds per 100 pounds of mixture, must be stated on a tag attached to each package.

The bill provides for 25 inspectors at salaries not over \$3,000 each and states that the Department Chemist shall do the analytical work. A registration fee of \$10 for each brand and an inspection fee of 50 cents a ton on all fertilizers and fertilizer materials are provided. Under-runs of 5 per cent or more in any plant food or in commercial value are subject to \$100 penalty for first offense and \$150 for each subsequent one. The bill contains other minor provisions.

### Potash Prices Unchanged

The principal potash-producing companies have announced their schedule of prices for the fertilizer year from June 1, 1944, to May 31, 1945.

Prices for the principal fertilizer potash salts are the same as have been maintained during the past year.

Muriate of potash, 60 per cent  $K_2O$  min., delivered at the principal United States ports, is priced at 53½ cents per unit  $K_2O$ . On shipments f. o. b. producing points, there is a deduction of 11.2 cents per unit  $K_2O$  when shipped from Carlsbad, New Mexico, and 8 cents per unit  $K_2O$  when shipped from Trona, Calif.

Manure salts are priced at 20 cents per unit  $K_2O$ , f. o. b. Carlsbad, New Mexico.

Sulphate of potash, basis 90-95 per cent  $K_2SO_4$ , is priced at \$36.25 per ton, delivered at the principal Atlantic or Gulf ports.

Sulphate of potash-magnesia, 40 per cent  $K_2SO_4$ , 18.5 per cent  $MgO$  is priced at \$26.00 per ton at the principal Atlantic and Gulf ports.

The usual seasonal discounts are again applicable. On orders accepted on or before June 30, 1944, for delivery in equal monthly quantities from June 1, 1944, through March, 1945, a discount of 8 per cent is allowed, with an additional 4 per cent discount upon completion of the entire tonnage delivery.

On orders accepted after June 30, 1944, but prior to October 1, 1944, for delivery from October 1, 1944, through March, 1945, a 4 per cent discount is allowed with an additional 2 per cent discount upon completion of the entire tonnage delivery.

All sales are, of course, subject to current government regulations. Any increases in transportation costs will be paid by the buyer.

### Superphosphate Production To Increase

The Chemical Bureau of the War Production Board on May 22nd recognized a tentative production goal of 9,464,000 tons of normal superphosphate for the agricultural year beginning July, 1944, to keep pace with the increased demand for fertilizer required for expanded food and fiber programs. The production goal for 1943-44, which was set at 7,000,000 tons of normal superphosphate, will be met, bureau officials said.

New plants, most of which have already been approved, are expected to produce 650,000 tons of the 1944-45 total of normal superphosphate, WPB said, and existing plants will be asked to step up output during the coming year by an average increase of 28 per cent, to be attained by the elimination of bottlenecks and increased efficiency of plant operation. Thus, with the new production and increased output in existing plants, it is hoped that the peak goal of 9,464,000 tons will be realized, Chemicals Bureau officials said. Members of the Superphosphate Producers Industry Advisory Committee, at a meeting recently held in Washington, pledged their cooperation in this newly announced program.

Limiting factors in attaining the goal are provision of raw materials—phosphate rock and sulphuric acid—and manpower necessary to convert the raw materials into finished superphosphate, the committee pointed out.

Representatives of rock mines said that with an adequate manpower supply, sufficient material could be provided to meet the new quotas.

Supplies of spent acid for superphosphate production will be greater this year, as a result of increased output from Government facilities. Approximately 207,000 tons, basis

100 per cent, were made available to the superphosphate industry last year, from Government facilities, as contrasted with the 309,000 tons anticipated for next year, officials of the Chemicals Bureau said.

Utilization of wage incentive plans in superphosphate plants was discussed at the meeting. The committee recommended further investigation into the types of plans that could be most advantageously adapted to the industry.

All bottlenecks in any phase of superphosphate production should be reported promptly to the Chemicals Bureau, officials told the committee, and every effort will be made to assist industry in overcoming production hurdles.

### Keim Moves Offices

Samuel D. Keim, broker in fertilizer materials and by-products, has moved his offices to Room 1006, 1343 Arch Street, Philadelphia 7, Pa. His telephone number remains unchanged: Rittenhouse 8113.

### Boron Booklet Issued

The Pacific Coast Borax Company has issued a 64-page booklet entitled *Boron in Agriculture*. The booklet discusses the effects of boron deficiency on 44 different crops, covering all of the principal grain, vegetable, orchard and pasture products. It is fully illustrated with 38 photographs. Recommendations for applications of borax to remedy a lack of boron are given for each crop. A copy of the booklet can be obtained by writing to the Company at 51 Madison Avenue, New York 10, N. Y.; 2295 Lumber Street, Chicago 16, Ill.; or 510 West 6th Street, Los Angeles 14, Calif.

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## FERTILIZER MATERIALS MARKET

### NEW YORK

**Increased Production in All the Principal Fertilizer Materials Promised for Next Fertilizer Year. Fertilizer Manufacturers Taking Allotments as They Become Available. Labor Situation May Prevent Accomplishment of Plan for Larger Superphosphate Output**

*Exclusive Correspondence to "The American Fertilizer"*

NEW YORK, May 31, 1944.

#### **Sulphate of Ammonia**

Allocations for the new year have now been issued, and we understand that allocations as made for this material are about 50 per cent more than the original allocations of a year ago. Previously, buyers were permitted to order out as much material as they might need for immediate shipment for June delivery up to 10 per cent of last year's allocation, but in most cases buyers did not feel that they needed nearby material as the allocations as originally made completed their program. There is no doubt that buyers will take their allocations of sulphate of ammonia in most cases, so there will be no building up of stocks at producing points.

#### **Ammonium Nitrate**

New prices have been established for this material, and a rising scale has been put in in an attempt to expedite delivery to manufacturers during July, August and September.

#### **Potash**

It is estimated that buyers can now figure on approximately 30 per cent more muriate than was received by them during last year, but it is quite certain that even with this increase manufacturers will have no difficulty of disposing of their entire productions.

#### **Superphosphate**

This material is moving in good volume, the demand is increasing steadily, and even if the goal set by WPB is reached in the new season, there should be no difficulty in taking care of the total production. However, an increase of 28 per cent in existing plants is a tremendous increase to expect under the existing conditions as the labor situation has not been cured.

### BALTIMORE

**Spring Tonnage Curtailed by Labor Shortage but Shipments Compare Favorably with Last Year. Little Change in Materials Situation. Burlap Now Available for Bags.**

*Exclusive Correspondence to "The American Fertilizer"*

BALTIMORE, May 31, 1944.

The spring fertilizer season has now been brought to a close with the advent of much warmer weather, and none of the manufacturers were able to complete their orders. As a consequence the tonnage shipped will be less than would have been the case had there been sufficient labor, but from all accounts compared favorably with last year's shipments.

*Ammoniates.*—Packing house by-products are practically all going into the manufacture of feeding materials which carry a higher ceiling than for fertilizer purposes.

*Castor Meal.*—Producers report being sold up for some months ahead and not taking on any further business at this time.

*Fish Scrap.*—Practically all this material is now going into the production of feed, and such sales as have been made have been on basis of subject to catch and for shipment "if and when made" at ceiling price.

*Sulphate of Ammonia.*—Shipments are still coming through against allocations and none of the manufacturers have been able to secure as much tonnage as they desire.

*Nitrate of Soda.*—It is anticipated that there will be a continued demand for this product in view of the fact that manufacturers were unable to ship all their orders for complete fertilizer. The market remains unchanged.

*Superphosphate.*—Up to the present time there has been no change in price, and ceiling of 64 cents per unit of A. P. A. in bulk, for run-of-pile, f. o. b. producers' works, is still being quoted, although manufacturers have only



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taken care of their regular customers.

**Potash.**—Practically all the manufacturers are again covering for their requirements for the coming season, and the market position is practically unchanged.

**Bone Meal.**—Both raw and steamed bone meal continues scarce and at prevailing nominal prices there is practically no demand.

**Bags.**—Order M-221 lifts all restrictions on burlap for fertilizer bags, due to the scarcity of cotton cloth as well as possible shortage of paper bags.

## CHARLESTON

**No Prices Quoted on Organic Futures. More Superphosphate Expected Next Year. Prices on Ammonium Nitrate Lowered for Summer.**

*Exclusive Correspondence to "The American Fertilizer"*

CHARLESTON, May 29, 1944.

**Organics.**—There still are no prices out on organics for the coming season.

**Blood.**—This has not changed. Price on domestic production is \$5.53 per unit of ammonia (\$6.72 per unit N) f. o. b., Chicago, Ill. Practically all is still going to feed.

**Superphosphate.**—The War Food Administration and WPB have now set a goal of over 9,400,000 tons in terms of normal superphosphate for 1944-45. This is based, however, on the manufacturers being able to get sufficient sulphuric acid and phosphate rock.

**Ammonium Nitrate.**—The prices on Ordnance products have been reduced for shipment covering June through September. During June and July the new price is \$46.00 per ton, f. o. b. nearest producing plant; for August, \$47.00; and for September, \$48.00. Buyers, who put in orders before July 1st for equal monthly shipments for the three months, will be allowed 5 per cent discount at time of billing and an additional 1½ per cent upon completion of the order.

## CHICAGO

**Little Activity in Fertilizer Organics Market. Material and Labor Shortage Prevents Quotations. Feed Demand Slackens Somewhat.**

*Exclusive Correspondence to "The American Fertilizer"*

CHICAGO, May 29, 1944.

Virtual inactivity reigned in the local organic market, reflecting an under-supply of material and progressively worse labor difficulties. Buyers appear ready, in the meantime to take on any prompt or future offerings.

There are no changes in the tankage and blood feed market; such sales as are reported are at full ceiling prices. Demand has slackened somewhat, and mixers are a bit more choosy about qualities.

Ceilings are well maintained:

High grade ground fertilizer tankage, \$3.85 to \$4.00 (\$4.68 to \$4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, \$5.53 per unit ammonia (\$6.72 per unit N); blood, \$5.38 (\$6.54 per unit N); dry rendered tankage, \$1.21 per unit of protein, Chicago basis.

## CLASSIFIED ADVERTISEMENTS

Advertisements for sale of plants, machinery, etc., and for help and employment, in this column, same type as now used, 60 cents per line, each insertion.

### HELP WANTED

**FOREMAN** for fertilizer plant in Baltimore area. Must have experience in shipping, batching, etc. and must be able to produce results. Good pay. Address "620" care THE AMERICAN FERTILIZER, Philadelphia.

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**HYDROCARBON PRODUCTS CO., INC.**

500 Fifth Avenue, New York

## Assignment of Inorganic Nitrogen, 1944-45

### All States Except West Coast

WPB has notified each fertilizer manufacturer in other than West Coast States that he may place contracts and orders immediately for designated quantities of UAL du Pont solution, Barrett solution basis 2a, ammonium nitrate, and sulphate of ammonia for mixing only, and of ammonium nitrate for direct application only, for delivery in approximately equal monthly quotas within carlot limitations during 1944-45.

In order to obtain even movement of ammonium nitrate and solutions throughout the year, the "tie" between the takings of these materials and sulphate of ammonia is continued. If a manufacturer uses ammonium nitrate for mixing, his quota has been approximately doubled as compared to last year, with the result that the "tie" will require him to take one-half (designated as his "minimum quantity") of his ammonium nitrate as a condition of obtaining approval of all of his sulphate of ammonia.

WPB will also approve shipments of ammonium nitrate to be used for mixing even though the particular manufacturer has no specific quota for that purpose, so long as the material is available after supplying all other demands for direct application and dry mixing. Pulverized cyanamid is to be used exclusively for conditioning mixed goods, and any manufacturer who wants to use any of this material must notify WPB by August 1st. Any tonnage used will be deducted from the manufacturer's assignment of sulphate of ammonia.

A manufacturer wishing to use Cal-nitro or ANL for mixing must notify WPB by August 1st. Any tonnage used will be deducted from the manufacturer's ammonium

nitrate "minimum quantity," or from his solution.

Subject to approval by WPB, a manufacturer having no facilities for using solutions, who is able to arrange with a superphosphate producer to ammoniate for him, may, as far as the supply of solutions permits, exchange ammonium nitrate for solutions on an equal nitrogen-content basis.

Companies operating in more than one State may pool their various State quotas and redistribute the materials to their plants, but the total units of inorganic nitrogen assigned to a particular State must be shipped to plants in that State and the redistribution of cars must comply with ODT cross-haul limitations.

So long as the supply permits, WPB will approve anticipation of later quotas during earlier months. When the buyer takes in excess of his minimum quotas of ammonium nitrate or solutions in the earlier months, WPB will approve a corresponding percentage of his sulphate of ammonia to move in the earlier months. In taking advantage of this provision the buyer may obtain more ammonium nitrate or solutions but not more sulphate of ammonia than is assigned to him.

Orders for shipment should be placed not later than the 5th of the month preceding the month of delivery. Otherwise delivery may be made to others, subject to WPB approval.

### West Coast States

WPB has notified each fertilizer manufacturer in the West Coast States that he may place contracts and shipping orders immediately for designated quantities of sulphate of ammonia, Ammo-phos 11-48, Ammo-phos 16-20, and ammonium nitrate for shipment during the six-months period, July-December, 1944, and has advised that allotments for the six-month period, January-June,



Trade Mark Registered

## MAGNESIUM LIMESTONE

"It's a Dolomite"

**American Limestone Company**  
Knoxville, Tenn.



# Bemis MULTIWALL PAPER SHIPPING BAGS ...

"SEWN WITH BEMIS SPECIAL THREAD. EH? SAY, THIS BAG IS CLOSED AS TIGHT AS A SCOTCHMAN'S POCKETBOOK"

"BEMIS MAKES ALL TYPES OF MULTI-WALL BAGS — SEWN OR PASTED, VALVE OR OPEN-MOUTH"

"IF YOU NEED A REAL WATERPROOF, MOISTUREPROOF BAG, BEMIS HAS IT"

"IT'S A SWELL ADVERTISEMENT... REGULAR BILLBOARD. AND BEMIS PRINTING MAKES IT STAND OUT ALMOST LIKE NEON LIGHTS"

"WHEN YOU SEE THE BEMIS BAG-MAKER'S CERTIFICATE, ON A BAG, YOU CAN BET IT EXCEEDS THE CONSOLIDATED FREIGHT CLASSIFICATION REQUIREMENTS. PLENTY TOUGH, SURE 'NOUGH"

"BEMIS BAGS ARE TAILOR-MADE TO YOUR REQUIREMENTS"

**Your Brand**

## CALL IN THE BEMIS MULTIWALL PAPER BAG EXPERT

Bemis has a staff of Multiwall Paper Bag experts which are at your service whether you are a Bemis customer or not. Call upon us any time you have a troublesome packaging problem. You'll find the Bemis Man an expert on all phases of such problems, whether it be bag

design, bag closing equipment, shipping or storing bags. Let him study your packaging operations. He may suggest ways to increase output, lower man power, cut costs or reduce waste. His call will cost you nothing and place you under no obligation.

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BETTER BAGS FOR 86 YEARS

MENTION "THE AMERICAN FERTILIZER" WHEN WRITING TO ADVERTISERS

1945, will be made later.

Manufacturers are requested to order one-sixth of each of the specified materials for shipment each month. Any monthly quota not so taken cannot be continued to later months. Requests to suppliers for shipments at a faster rate will be approved if materials are available.

A manufacturer's request for ammonium nitrate needed in excess of his assigned quantity will be approved so long as material is available from Canada, after other necessary requirements are supplied. Any excess tonnage over his quota so taken will not be deducted from his second period allotment.

The materials assigned are exclusively for manufacture of fertilizer and for sale to the manufacturer's consuming customers and through his agents. A manufacturer may not sell such materials to another fertilizer company which itself receives allocations from WPB. A manufacturer may not purchase nitrogen materials from a competitor without approval of WPB.

Orders for shipment should be placed not later than the 5th of the month preceding the month of delivery. Otherwise delivery may be made to others, subject to WPB approval.

### Recommended 1945 National Wheat and Rye Goals

A national goal of 67 to 70 million acres of wheat for harvest in 1945 has been announced by War Food Administrator Marvin Jones. This compares with an estimate of about 67 million acres planted for this year's wheat crop, and with 55 million acres in 1943.

The goal is based on the estimated requirements for use in the 1945-46 year and on preliminary information from all wheat-producing States as to their wartime capacity for wheat production in desirable balance with other crops, and without plowing up marginal land which should stay in grass.

The goal acreage will provide adequate wheat for food, and as much margin for livestock feed and industrial uses as can be produced in wheat more efficiently than in other grain or feed crops.

The national wheat goal is being submitted to the States, through the U. S. D. A. War Boards, along with suggestions for the establishment of State goals within the local determination of necessary crop balance to get the greatest overall production of grains.

Acreage of rye for harvest as grain in 1945

at a level comparable with the 1944 acreage—about 2,500,000 acres—is being recommended. This will provide for maintenance of rye production in areas where rye will produce more food or feed than alternative crops.

It is expected that the final State goals will be announced in about a month.

### Feeding Hungry Crops in War and Peace

(Continued from page 7)

20 per cent of this country's total production of food, feed, and fibre is directly due to the use of commercial plant food. The figures vary greatly for different crops and for different States. For example, we estimate that in 1942 51 per cent of the American tobacco crop was produced by fertilizer, 32 per cent of the potatoes, 23 per cent of the cotton, 40 per cent of the fruit and vegetables; but only 9 per cent of the corn crop and 7 per cent of the wheat crop were produced by fertilizers. We estimate that 51 per cent of the total crop production of Georgia is due to fertilizer use, but for Texas the figure is only one per cent due to the very large acreage of crops which receives no fertilizer at all.

Our surveys have shown that, just before the war began, the farmer was getting crop increases worth about \$3.60 for each dollar spent for fertilizer. Now, due to higher crop prices and only a small increase in fertilizer cost, the farmer is getting on the average of between \$5.00 and \$6.00 for each dollar spent. This, of course, is one explanation of the present heavy demand for fertilizer.

I feel, therefore, that we have done a fair job of supplying plant food and that the vertical expansion of farm production, which the

## Stedman FERTILIZER PLANT EQUIPMENT

Dependable for Fifty Years

All-Steel  
Self-Contained  
Fertilizer  
Mixing Units  
Batch Mixers—  
Dry Batching

Pan Mixers—  
Wet Mixing  
Swing Hammer  
and Cage Type  
Tailings  
Pulverizers

Vibrating  
Screens  
Dust Weigh  
Hoppers  
Acid Weigh  
Scales

STEDMAN'S FOUNDRY & MACHINE WORKS  
AUBURN, INDIANA, U. S. A.      Founded 1894

# CHEMICO ACID PLANTS

REDUCE COSTS... INCREASE OUTPUT

The design and selection of CHEMICO plants and equipment are based on 29 years of specialized experience and the results obtained in world-wide installations. Whether you are interested in a complete acid plant, an acid concentrator, ammoniation apparatus or a complete fertilizer plant consult the CHEMICO engineers. Their authoritative advice is offered without charge or obligation. Your inquiry is invited.

Chemical Construction Corporation  
30 Rockefeller Plaza, New York 20, N.Y.



CHEMICO PLANTS  
are PROFITABLE  
INVESTMENTS

## Keyed SERVICE!

Fertilizer plants all over the country—large and small—state their needs and we meet them. Large stocks of seasoned materials and ample modern production facilities enable us to make prompt shipments.

## TRIPLE SUPERPHOSPHATE

46 to 48% Available Phosphoric Acid

*We also manufacture*  
**HIGH-GRADE SUPERPHOSPHATE**

**U. S. Phosphoric Products**

Division  
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Reliability

## SPECIFY THREE ELEPHANT



... WHEN BORON IS NEEDED TO CORRECT A DEFICIENCY OF THIS IMPORTANT SECONDARY ELEMENT

Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

**AMERICAN POTASH & CHEMICAL CORPORATION**

122 East 42nd ST., NEW YORK CITY

Pioneer Producers of Muriate of Potash in America

See Page 4





use of this plant food has made possible, is in the public interest, for, if this vertical expansion had not been possible, it would have been necessary to expand horizontally and to plow up and cultivate some 50,000,000 additional acres. Roughly, such an expansion of acres would have cost our farmers at least \$1,000,000,000 in additional annual production costs, or about three times the present total expenditure for commercial fertilizer.

Now, at the present rate of farm production, what are we doing to our soils? Well, we are certainly doing a better job of returning the plant food which we are removing than ever before in the history of the country. A recent study by the War Food Administration indicates that we are now for the first time returning to the soil through commercial fertilizers slightly more phosphorus than we are removing in harvested crops. In this connection, however, we must remember that phosphorus is very quickly fixed in the soil and becomes relatively unavailable for immediate use. We are returning something like one-eighth of the nitrogen removed and about one-fourth of the potash. But nitrogen and potash are in an entirely different category from phosphorus, insofar as the replacement of quantities

removed by crops is concerned. Much of the nitrogen needed in crop production can be obtained from the air by growing and plowing under leguminous cover crops. Fixed nitrogen is also brought down by rain, and a substantial quantity is fixed in many soils by non-symbiotic bacteria—those that do not require the benefit of legumes—and there is, of course, much nitrogen in the crop residues that are returned to the land.

For these reasons it is unnecessary, in the regular course of good farming operations, to return all of the nitrogen removed. For a very different reason, it is not necessary to return all of the potash removed in harvested crops. Most soils contain large quantities of potash—some 30,000 to 40,000 pounds per acre to plow depth—and, although most of this potash is in forms that are unavailable to crops, most soils supply a considerable part of the potash needed and will continue to do so for many years.

*To be continued in the next issue*

### Phosphate Rock in 1943

(Continued from page 11)

years. Total stocks in the hands of producers on December 31, 1943, were 640,000 tons, a considerable increase over those on hand at the close of 1942.

TABLE VII  
TENNESSEE PHOSPHATE ROCK (INCLUDING SINTERED MATRIX) SOLD OR USED BY PRODUCERS, 1939-43  
(INCLUDES APATITE FROM VIRGINIA)  
Value at mines

Year	Long tons	Total	Average
1939 <sup>1</sup> .....	938,448	\$3,856,505	\$4.11
1940.....	994,361	3,967,043	3.99
1941.....	1,120,358	4,590,965	4.10
1942 <sup>2</sup> .....	1,366,335	6,127,792	4.48
1943 <sup>2</sup> .....	1,309,059	5,822,249	4.45

<sup>1</sup>Separate figures for brown rock and blue rock cannot be given without disclosing confidential data regarding blue-rock production.

<sup>2</sup>Includes a small quantity of blue rock.

Mining operations in the Tennessee brown rock phosphate field in 1943 were carried on by the Tennessee Valley Authority and the following private companies: Armour Fertilizer Works, Federal Chemical Co., Gilbreath & Pressnell, Harsh Phosphate Co., Hoover & Mason Phosphate Co., International Minerals & Chemical Corporation, Monsanto Chemical Co., and the Virginia-Carolina Chemical Corporation.

According to the annual report of the Tennessee Valley Authority for the fiscal year ended June 30, 1943, a total of 253,840 tons of phosphatic materials, all from deposits in Tennessee, was received at Muscle Shoals

## NORFOLK BAG COMPANY

509 Flatiron Building  
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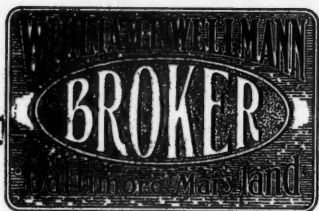
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## Specializing in

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**Superphosphate**  
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**Bags**

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**Charleston, S. C.**

during the fiscal year. Large scale operation of the TVA field phosphate plants in middle Tennessee got under way, although necessary changes and substitutions in experimental units reduced deliveries below the amount expected. Total shipments from the field plants amounted to 117,000 dry net tons, of which 89,000 tons were used in phosphate operations. The latter amount corresponds to about one-third of the total consumed during the period. By the close of the fiscal year, the field plants were supplying approximately two-thirds of the total tonnage of phosphate needed for operation of the Muscle Shoals plant. The remainder was being purchased.

Additional phosphate reserves were acquired in Tennessee by TVA during the year, including mineral rights on deposits containing an estimated 5,167,000 tons of minable phosphate and an estimated 893,000 tons of minable phosphate on land acquired in fee simple. The net increase in TVA's phosphate reserves—new reserves acquired, less 214,000 tons mined—was 5,846,000 tons, or an increase in the total reserve of from 22,100,000 to 28,000,000 tons of minable phosphate.

Military demands for elemental phosphorus took approximately two-thirds of the entire TVA production of 18,900 tons during the fiscal year 1943, and somewhat more than one-fifth of the military supply was provided for Lend-Lease shipment. During the year, the TVA completed conversion of all of its phosphorus electric furnaces but one to production of munitions-grade elemental phosphorus. One furnace produces phosphoric acid directly.

Although somewhat more than 6,000 tons of phosphorus not immediately demanded by the War Department were used in the manufacture of concentrated superphosphate and calcium metaphosphate, the over-all production of these plant foods represented a sharp

reduction for the second year in succession. At the same time much less was available for domestic agricultural use because 54,000 of the 77,300 tons of concentrated superphosphate shipped from Muscle Shoals was provided for Lend-Lease. Actual production was about 60,200 tons of concentrated superphosphate and 7,300 tons of calcium metaphosphate.

*Virginia.*—The Southern Mineral Products Corporation, a subsidiary of the Vanadium Corporation of America, operated its Piney River nelsonite deposit during most of 1943, disposing of the apatite and ilmenite concentrates recovered at its mill to the adjacent plant of the Virginia Chemical Corporation. The ilmenite was used in the manufacture of titanium dioxide, and the apatite in the production, during the early months of 1943, of mono-calcium phosphate. Manufacture of this latter chemical was discontinued in July, 1943, and the apatite later was used for making defluorinated phosphate. The Virginia Chemical Corporation, a wholly owned subsidiary of Interchemical Corporation, purchased the physical assets of the Southern Mineral Products Corporation on December 22, 1943. Early in 1944 the company was manufacturing titanium dioxide, sulphuric acid, ferrous sulphate, defluorinated phosphate, and hydrated yellow ferric oxide.

#### World Production

Figures for the production in 1943 of phosphate rock in most foreign countries are not yet available, nor is there much information obtainable regarding the foreign phosphate rock industries. Several of the Japanese-held phosphate islands in the Pacific, including Nauru and Angaur islands and the apatite workings near Laokay in French Indo-China, were bombed by the Allies in 1943 and early in 1944.

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the number of pounds of raw material for a desired per cent. of plant food in a ton of mixed goods—or find what per cent. of a certain plant food in a ton of fertilizer produced by a specific quantity of raw materials.

No mathematical calculations are necessary. You can find the figures in a few seconds with the aid of

## Adams' Improved Pocket Formula Rule

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To make clearer its use, answers to such problems as the following can be quickly obtained:

How much sulphate of ammonia, containing 20 per cent. of nitrogen, would be needed to give  $4\frac{1}{2}$  per cent. nitrogen in the finished product?

Seven hundred and fifty pounds of tankage, containing 8 per cent. phosphoric acid are being used in a mixture. What per cent. of phosphoric acid will this supply in the finished goods?

Should the Adams' Formula Rule become soiled from handling, it may be readily cleaned with a damp cloth.

PRICE  
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TO BE SENT  
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# BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"



This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc. For Alphabetical List of Advertisers, see page 33.



## ACID BRICK

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.

## ACID EGGS

Chemical Construction Corp., New York City.

## ACIDULATING UNITS

Chemical Construction Corp., New York City.  
Sackett & Sons Co., The A. J., Baltimore, Md.

## AMMO-PHOS

American Cyanamid Co., New York City.

## AMMONIA—Anhydrous

Barrett Division, The, Allied Chemical & Dye Corp., New York City.  
DuPont de Nemours & Co., E. I., Wilmington, Del.  
Hydrocarbon Products Co., New York City.

## AMMONIA LIQUOR

Barrett Division, The, Allied Chemical & Dye Corp., New York City.  
DuPont de Nemours & Co., E. I., Wilmington, Del.  
Hydrocarbon Products Co., New York City.

## AMMONIA OXIDATION UNITS

Chemical Construction Corp., New York City.

## AMMONIATING EQUIPMENT

Sackett & Sons Co., The A. J., Baltimore, Md.

## AMMONIUM NITRATE SOLUTIONS

Barrett Division, The, Allied Chemical & Dye Corp., New York City.

## AUTOMATIC ELEVATOR TAKEUPS

Sackett & Sons Co., The A. J., Baltimore, Md.

## BABBITT

Sackett & Sons Co., The A. J., Baltimore, Md.

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Bagpak, Inc., New York City.  
Bemis Bro. Bag Co., St. Louis, Mo.  
St. Regis Paper Co., New York City.  
Textile Bag Mfrs. Association, Chicago, Ill.  
Union Bag & Paper Corporation, New York City.

## BAGS—Cotton

Bemis Bro. Bag Co., St. Louis, Mo.  
Textile Bag Mfrs. Association, Chicago, Ill.

## BAGS—Paper

Bagpak, Inc., New York City  
Bemis Bro. Bag Co., St. Louis, Mo.  
St. Regis Paper Co., New York City.  
Union Bag & Paper Corporation, New York City.

## BAGS (Waterproof)—Manufacturers

Bemis Bro. Bag Co., St. Louis, Mo.  
St. Regis Paper Co., New York City.  
Textile Bag Mfrs. Association, Chicago, Ill.  
Union Bag & Paper Corporation, New York City.

## BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Huber & Company, New York City.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Wellmann, William E., Baltimore, Md.

## BAG CLOSING MACHINES

Bagpak Inc., New York City.  
St. Regis Paper Co., New York City.

## BAGGING MACHINES—For Filling Sacks

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Sackett & Sons Co., The A. J., Baltimore, Md.

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Sackett & Sons Co., The A. J., Baltimore, Md.

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Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
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American Agricultural Chemical Co., New York City.  
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American Agricultural Chemical Co., New York City  
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Bradley & Baker, New York City.  
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Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalts, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

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American Potash and Chem. Corp., New York City  
Pacific Coast Borax Co., New York City.

## BROKERS

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Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Dickerson Co., The, Philadelphia, Pa.  
Huber & Company, New York City.  
Jett, Joseph C., Norfolk, Va.  
Keim, Samuel L., Philadelphia, Pa.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalts, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

## BUCKETS—Elevator

Link-Belt Company, Philadelphia, Chicago  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in  
"The American Fertilizer"

## BUYERS' GUIDE

For an Alphabetical List of all the  
Advertisers, see page 33

### BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.

### BURNERS—Sulphur

Chemical Construction Corp., New York City.

### BURNERS—Oil

Monarch Mfg. Works, Inc., Philadelphia, Pa.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### CABLEWAYS

Hayward Company, The, New York City.

### CARBONATE OF AMMONIA

American Agricultural Chemical Co., New York City.  
DuPont de Nemours & Co., E. I., Wilmington, Del.

### CARS—For Moving Materials

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Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### CARTS—Fertilizer, Standard and Roller Bearing

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Sackett & Sons Co., The A. J., Baltimore, Md.

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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Duriron Co., Inc., The, Dayton, Ohio.

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Fairlie, Andrew M., Atlanta, Ga.

### CHEMICAL APPARATUS

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Duriron Co., Inc., The, Dayton, Ohio.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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American Cyanamid Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
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Bradley & Baker, New York City.  
DuPont de Nemours & Co., E. I., Wilmington, Del.  
Huber & Company, New York City.

### CHEMICALS—Continued

International Minerals & Chemical Corporation, Chicago, Ill.  
McIver & Son, Alex. M., Charleston, S. C.  
Phosphate Mining Co., The, New York City.  
Wellman, William E., Baltimore, Md.

### CHEMICAL PLANT CONSTRUCTION

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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.  
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Sackett & Sons Co., The A. J., Baltimore, Md.  
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Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### CONCENTRATORS—Sulphuric Acid

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.

### CONDITIONERS AND FILLERS

American Limestone Co., Knoxville, Tenn.  
Dickerson Co., The, Philadelphia, Pa.  
Phosphate Mining Co., The, New York City

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Tennessee Corporation, Atlanta, Ga.

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Ashcraft-Wilkinson Co., Atlanta, Ga.  
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Bradley & Baker, New York City.  
Huber & Company, New York City  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalz, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

### CRANES AND DERRICKS

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### CYANAMID

American Agricultural Chemical Co., New York City  
American Cyanamid Co., New York City.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Jett, Joseph C., Norfolk, Va.  
Wellmann, William E., Baltimore, Md.

### DENS—Superphosphate

Chemical Construction Corp., New York City.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

## Andrew M. Fairlie

### CHEMICAL ENGINEER

22 Marietta Street Building ATLANTA, GA.

CABLE ADDRESS: "SULFACID ATLANTA"

**S**ULPHURIC Acid Plants . . . Design, Construction, Equipment . . . Operation . . . Mills-Packard Water-Cooled Acid Chambers, Gaillard Acid-Cooled Chambers, Gaillard Acid Dispersers, Contact Process Sulphuric Acid Plants.

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### DISINTEGRATORS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### DRYERS—Direct Heat

Sackett & Sons Co., The A. J., Baltimore, Md.

### DRIVES—Electric

Link-Belt Company, Philadelphia, Chicago.

### DUMP CARS

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### DUST COLLECTING SYSTEMS

Sackett & Sons Co., The A. J., Baltimore, Md.

### ELECTRIC MOTORS AND APPLIANCES

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### ELEVATORS

Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### ELEVATORS AND CONVEYORS—Portable

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### ENGINES—Steam

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### EXCAVATORS AND DREDGES—Drag Line and Cableway

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

### FERTILIZER MANUFACTURERS

American Agricultural Chemical Co., New York City.  
American Cyanamid Company, New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Farmers Fertilizer Company, Columbus, Ohio.  
International Minerals and Chemical Corporation, Chicago, Ill.  
Phosphate Mining Co., The, New York City.  
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

### FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Wellmann, William E., Baltimore, Md.

### FOUNDERS AND MACHINISTS

Atlanta Utility Works, East Point, Ga.  
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### GARBAGE TANKAGE

Wellmann, William E., Baltimore, Md.

### GEARS—Machine Moulded and Cut

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### GEARS—Silent

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### GELATINE AND GLUE

American Agricultural Chemical Co., New York City.

### GUANO

Baker & Bro., H. J., New York City.

### HOISTS—Electric, Floor and Cage Operated, Portable

Hayward Company, The, New York City.

### HOPPERS

Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Wellmann, William E., Baltimore, Md.

### IRON SULPHATE

Tennessee Corporation, Atlanta, Ga.

### INSECTICIDES

American Agricultural Chemical Co., New York City.

### LACING—Belt

Sackett & Sons Co., The A. J., Baltimore, Md.

### LIMESTONE

American Agricultural Chemical Co., New York City.  
American Limestone Co., Knoxville, Tenn.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
McIver & Son, Alex. M., Charleston, S. C.  
Wellmann, William E., Baltimore, Md.

### LOADERS—Car and Wagon, for Fertilizers

Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### MACHINERY—Acid Making

Atlanta Utility Works, East Point, Ga.  
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.  
Duriron Co., Inc., The, Dayton, Ohio.  
Fairlie, Andrew M., Atlanta, Ga.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MACHINERY—Coal and Ash Handling

Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### MACHINERY—Elevating and Conveying

Atlanta Utility Works, East Point, Ga.  
Hayward Company, The, New York City.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MACHINERY—Grinding and Pulverizing

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

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### MACHINERY—Power Transmission

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Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MACHINERY—Pumping

Atlanta Utility Works, East Point, Ga.  
Duriron Co., Inc., The, Dayton, Ohio.

### MACHINERY—Tankage and Fish Scrap

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MAGNETS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### MANGANESE SULPHATE

McIver & Son, Alex. M., Charleston, S. C.  
Tennessee Corporation, Atlanta, Ga.

### MIXERS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### NITRATE OF SODA

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Barrett Division, The, Allied Chemical & Dye Corp., New York City.  
Bradley & Baker, New York City.  
Chilean Nitrate Sales Corp., New York City.  
Huber & Company, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalts, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

### NITRATE OVENS AND APPARATUS

Chemical Construction Corp., New York City.

### NITROGEN SOLUTIONS

Barrett Division, The, Allied Chemical & Dye Corp., New York City.

### NITROGENOUS ORGANIC MATERIAL

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
DuPont de Nemours & Co., Wilmington, Del.  
Huber & Company, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
McIver & Son, Alex. M., Charleston, S. C.  
Smith-Rowland Co., Norfolk, Va.  
Wellmann, William E., Baltimore, Md.

### NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.

### PACKING—For Acid Towers

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Chemical Construction Corp., New York City.

### PANS AND POTS

Stedman's Foundry and Mach. Works, Aurora, Ind.

### PHOSPHATE MINING PLANTS

Chemical Construction Corp., New York City.

### PHOSPHATE ROCK

American Agricultural Chemical Co., New York City.  
American Cyanamid Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Coronet Phosphate Co., New York City.  
Huber & Company, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Phosphate Mining Co., The, New York City.  
Ruhm, H. D., Mount Pleasant, Tenn.  
Schmalts, Jos. H., Chicago, Ill.  
Southern Phosphate Corp., Baltimore, Md.  
Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.  
Wellmann, William E., Baltimore, Md.

### PIPE—Acid Resisting

Duriron Co., Inc., The, Dayton, Ohio.

### PIPES—Chemical Stoneware

Chemical Construction Corp., New York City.

### PIPES—Wooden

Stedman's Foundry and Mach. Works, Aurora, Ind.

### PLANT CONSTRUCTION—Fertilizer and Acid

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### POTASH SALTS—Dealers and Brokers

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jett, Joseph C., Norfolk, Va.  
Schmalts, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

### POTASH SALTS—Manufacturers

American Potash and Chem. Corp., New York City.  
Potash Co. of America, New York City.  
International Minerals & Chemical Corp., Chicago, Ill.  
United States Potash Co., New York City.

### PULLEYS AND HANGERS

Atlanta Utility Works, East Point, Ga.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### PUMPS—Acid-Resisting

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Duriron Co., Inc., The, Dayton, Ohio.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.

### PYRITES—Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., New York City.  
Wellmann, William E., Baltimore, Md.

### QUARTZ

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

### RINGS—Sulphuric Acid Tower

Chemical Construction Corp., New York City.

### ROUGH AMMONIATES

Bradley & Baker, New York City.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalts, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.



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### SCRAPERS—Drag

Hayward Company, The, New York City.

### SCREENS

Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### SEPARATORS—Air

Sackett & Sons Co., The A. J., Baltimore, Md.

### SEPARATORS—Including Vibrating

Sackett & Sons Co., The A. J., Baltimore, Md.

### SEPARATORS—Magnetic

Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### SHAFTING

Atlanta Utility Works, East Point, Ga.  
Link-Belt Company, Philadelphia, Chicago.  
Sackett & Sons Co., The A. J., Baltimore, Md.  
Stedman's Foundry and Mach. Works, Aurora, Ind.

### SHOVELS—Power

Link-Belt Company, Philadelphia, Chicago.  
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar  
Rapids, Iowa.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### SPRAYS—Acid Chambers

Monarch Mfg. Works, Inc., Philadelphia, Pa.

### SPROCKET WHEELS (See Chains and Sprockets)

### STACKS

Sackett & Sons Co., The A. J., Baltimore, Md.

### SULPHATE OF AMMONIA

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Barrett Division, The, Allied Chemical & Dye Corp., New  
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Hydrocarbon Products Co., New York City.  
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McIver & Son, Alex. M., Charleston, S. C.  
Schmalz, Jos. H., Chicago, Ill.  
Wellmann, William E., Baltimore, Md.

### SULPHUR

Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Freeport Sulphur Co., New York City.  
Texas Gulf Sulphur Co., New York City.

### SULPHURIC ACID

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Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
Huber & Company, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M. Charleston, S. C.

### SULPHURIC ACID—Continued

U. S. Phosphoric Products Division, Tennessee Corp.,  
Tampa, Fla.  
Wellmann, William E., Baltimore, Md.

### SUPERPHOSPHATE

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
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U. S. Phosphoric Products Division, Tennessee Corp.,  
Tampa, Fla.  
Wellmann, William E., Baltimore, Md.

### SUPERPHOSPHATE—Concentrated

Armour Fertilizer Works, Atlanta, Ga.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Phosphate Mining Co., The, New York City.  
U. S. Phosphoric Products Division, Tennessee Corp  
Tampa, Fla.

### SYPHONS—For Acid

Monarch Mfg. Works, Inc., Philadelphia, Pa.

### TALLOW AND GREASE

American Agricultural Chemical Co., New York City.

### TANKAGE

American Agricultural Chemical Co., New York City.  
Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City.  
Bradley & Baker, New York City.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jett, Joseph C., Norfolk, Va.  
McIver & Son, Alex. M., Charleston, S. C.  
Schmalz, Jos. H., Chicago, Ill.  
Smith-Rowland, Norfolk, Va.  
Wellmann, William E., Baltimore, Md.

### TANKAGE—Garbage

Huber & Company, New York City.

### TANKS

Sackett & Sons Co., The A. J., Baltimore, Md.

### TILE—Acid-Proof

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

### TOWERS—Acid and Absorption

Chemical Construction Corp., New York City.  
Fairlie, Andrew M., Atlanta, Ga.

### UNLOADERS—Car and Boat

Hayward Company, The, New York City.  
Sackett & Sons Co., The A. J., Baltimore, Md.

### UREA

DuPont de Nemours & Co., E. I., Wilmington, Del.

### UREA-AMMONIA LIQUOR

DuPont de Nemours & Co., E. I., Wilmington, Del.

### VALVES—Acid-Resisting

Atlanta Utility Works, East Point, Ga.  
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.  
Duriron Co., Inc., The, Dayton, Ohio.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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*A Source of Potash for  
Tobacco Growers*

**SAMUEL D. KEIM**

(SINCE 1898)

**1343 ARCH STREET  
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MENTION "THE AMERICAN FERTILIZER" WHEN WRITING TO ADVERTISERS.

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Have replaced other sprays in most plants throughout the world. Made of stoneware. Will not break or crack from temperature changes. Hard lead body and cap.

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See Catalog 6-C

Fig. 6099 **MONARCH MFG. WORKS, INC.**  
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NATURAL CHILEAN NITRATE

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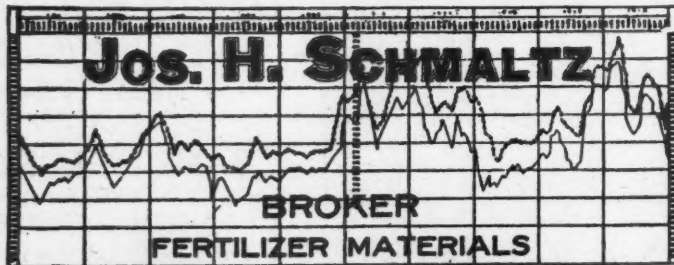
1330 Vine St., Philadelphia

**WILEY & COMPANY, Inc.**

Analytical and Consulting  
Chemists

BALTIMORE, MD.

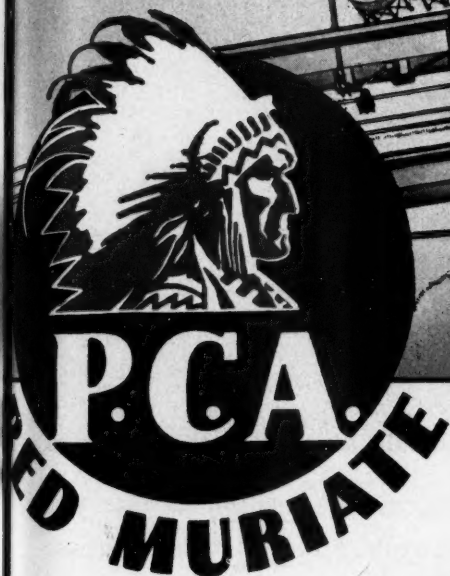
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Ammoniates



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*Above is a bird's eye view of the plant at Carlsbad, N. M. where Potash Company of America mines and refines its products.*

*And at left is the Red Indian trade-mark of Potash Company of America which identifies Potash products of uniformly high quality.*

P. C. A.'s modern plant at Carlsbad today produces more 60% MURIATE OF POTASH than any other potash plant in the United States.

During the four critical years since imports ceased, agriculture's supply of 60% MURIATE from all domestic producers has increased by 228,000 tons.

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P. C. A.'s Red Indian keeps marching. Its progress bears watching. It promises a greatly increased quantity of 60% RED MURIATE during the next twelve months.



**POTASH COMPANY of AMERICA**

CARLSBAD, NEW MEXICO



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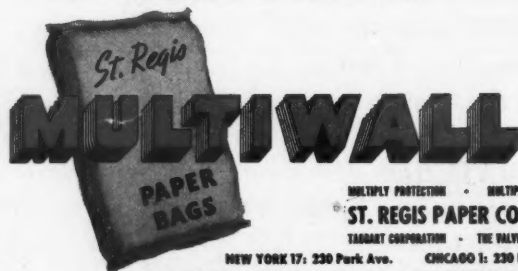


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SAN FRANCISCO 4: 1 Montgomery St.

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Franklin, Va.

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Seattle, Wash.

Birmingham, Ala.  
Seattle, Wash.

Dallas, Tex.  
Nazareth, Pa.

New Orleans, La.

Denver, Colo.  
Cledo, Ohio

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